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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/043,849	01/10/2002	Michael Stuart Weaver	UDC-20101	1152

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EXAMINER	
LEURIG, SHARLENE L	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 02/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/043,849	WEAVER ET AL.	
	Examiner	Art Unit	
	Sharlene Leurig	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *092403*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. The amendment filed on September 24, 2003 has been entered and acknowledged by the examiner. Claim 1 has been added and claims 8, 10, 19, 21 and 25-27 have been amended.

Allowable Subject Matter

2. The indicated allowability of claims 10-18 and 28-30 is withdrawn in view of the newly discovered reference(s) to Affinito (6,268,695). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 2-18 and 21-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Affinito (6,268,695) (of record) in view of Duggal et al. (US 2001/0033135 A1) (of record).

Regarding claim 10, Affinito discloses an organic light-emitting device comprising a substrate (Figure 2, element 150), an active region (160) positioned over the

substrate, the active region comprising an anode layer, a cathode layer and a light-emitting layer disposed between the anode and the cathode (column 4, lines 30-40), and one or more composite barrier layers disposed over and under the active region, the composite barrier layers composed of an alternating series of one or more polymeric planarizing sublayers (132, 136) and one or more high-density sublayers (134, 144).

Affinito lacks disclosure of any of the polymeric planarizing sublayers containing microparticles that increase the out-coupling efficiency of the OLED.

Duggal teaches that microparticles (Figure 3, element 9) embedded in a polymeric planarizing layer (7) formed on an OLED (page 4, paragraph 0047) improve the efficiency of the OLED by scattering the emitted light (page 1, paragraph 0008; page 4, paragraph 0045).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the OLED disclosed by Affinito to have microparticles formed in a polymeric planarizing sublayer of the composite barrier layer in order to improve the out-coupling of the device by increasing the amount of scattered light, as taught by Duggal.

Regarding claim 2, Affinito discloses a substrate comprised of an inorganic material or an organic material (column 3, lines 45-50).

Regarding claim 3, Affinito discloses a preference for the layers beneath the active region to be transparent, and therefore discloses a transparent substrate (column 3, lines 23-25).

Regarding claim 4, Affinito discloses that the substrate may comprise metal (column 3, lines 46-49) and that substrates may be constructed of glass (column 1, line 20).

Regarding claims 5 and 6, Affinito discloses a substrate comprising a polymeric material that can be flexible (column 3, lines 45-48).

Regarding claim 7, Affinito discloses a substrate formed of polyethyleneterephthalate (PET), which is a type of polyester (column 3, line 49).

Regarding claim 8, one of the polymer layers (142) disclosed by Affinito that may contain microparticles, as taught by Duggal, is formed on a top surface of the substrate (150).

Regarding claims 9 and 12, Affinito discloses that the substrate may be made of a transparent flexible polymeric material (column 3, lines 45-48) and that substrates may be constructed of glass (column 1, line 20).

Regarding claim 11, Affinito discloses a composite barrier layer (130 and 140) formed on a top surface of the substrate (150).

Regarding claim 13, Affinito discloses a composite barrier layer (130, 140) comprising an alternating series of two or more polymeric planarizing sublayers (144, 132, 136) and two or more high-density sublayers (144, 134).

Regarding claim 14, Affinito discloses a composite barrier layer (130, 140) that can be disposed over the active region (160).

Regarding claim 15, Duggal teaches microparticles formed in a polymeric planarizing sublayer, as discussed above, but lacks disclosure of multiple polymeric planarizing sublayers containing microparticles.

However, it would have been obvious to one of ordinary skill in the art at the time of the invention to include microparticles in more than one of the polymeric planarizing sublayers disclosed by Affinito, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.,* 193 USPQ 8.

Therefore regarding claim 15, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the OLED of Affinito by including microparticles in the polymeric planarizing sublayer, as taught by Duggal, in order to increase the efficiency of the device, and to further modify it to have microparticles in more than one of the polymeric planarizing sublayers in order to increase the amount of scattered light and thereby further increase the efficiency of the device.

Regarding claim 16, Affinito discloses polymeric sublayers that are formed adjacent the substrate.

Duggal teaches that the microparticle-containing polymeric layer can be formed over or under the OLED and adjacent the substrate (Figure 3).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the microparticles into any one of the polymeric planarizing sublayers disclosed by Affinito, including the layer closest to the substrate, in order to increase the efficiency of the device, as taught by Duggal,.

Regarding claim 17, Affinito discloses a composite barrier layer (130, 140) disposed on the substrate (150), having polymeric sublayers adjacent the OLED.

Duggal teaches that the microparticle-containing polymeric layer can be formed adjacent the OLED (paragraph 0047).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the microparticles into any one of the polymeric planarizing sublayer disclosed by Affinito, including the layer closest to the OLED, in order to increase the efficiency of the device, as taught by Duggal.

Regarding claim 18, Affinito discloses a composite barrier layer (130, 140) disposed over the active region (160).

Regarding claim 21, the microparticles taught by Duggal comprise a transparent inorganic material (page 3, paragraph 0035, lines 4-6). Though Duggal does not use the word "transparent", the disclosure that the microparticles have the same index of refraction of the adjacent layer of the device, which must be transparent to allow the emitted light to pass through, means that the microparticles themselves must be transparent to light.

Regarding claim 22, Duggal teaches microparticles comprised of glass, such as SiO_2, which is silica glass (page 3, paragraph 0036, lines 1-5).

Regarding claims 23 and 24, Duggal teaches microparticles comprising metal oxide such as TiO_2 (page 3, paragraph 0036, lines 1-3).

Therefore regarding claims 21-23, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the polymeric planarizing

sublayers of Affinito to have microparticles made of a transparent material such as glass or titania, as taught by Duggal, in order to effectively scatter light and thereby increase the efficiency of the device.

Regarding claim 25, Affinito teaches that the polymeric planarizing sublayers may be comprised of a polymer, and uses the open-ended example of polyethylenephthalate (PET) (column 3, lines 45-48). However, Affinito does not limit the type of polymer to PET.

Duggal teaches a polymeric planarizing material of polycarbonate, which has refractive index of 1.6 to 1.65 (page 3, paragraph 0033, lines 13-17). Duggal further teaches microparticles comprising a material of a refractive index higher than 1.9, since the entire polymeric planarizing layer the reference teaches has a refractive index of 1.9 (page 11, paragraph 0109, line 14-16). The total refractive index of the polymer material with the microparticles is adjusted to be between the indices of the polymer and the microparticles themselves (page 4, lines 1-3). Since the composite refractive index of the layer can be as high as 1.9 and the polymer material has a lower refractive index than that, the refractive index of the microparticles must be higher than 1.9, and thus must be within the claimed range of 1.7 or greater.

Regarding claim 26, Duggal teaches that the refractive index of the microparticles should be different from the refractive index of the polymeric sublayer in order for light to be scattered within the layer (page 4, paragraph 0039, lines 1-3).

Regarding claim 27, Duggal teaches that the difference between the refractive index of the microparticles and the polymer must be greater than 0.3, according to the reasoning discussed above in relation to claim 25.

Therefore regarding claims 25-27, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the OLED of Affinito to have polymeric planarizing sublayer made of a polymer such as polycarbonate having an index of refraction of between 1.6-1.65, in order to provide a readily-available polymer, and to further modify it to have microparticles to increase the efficiency of the device, the microparticles having a higher index of refraction than the polymeric sublayer in order for the light to be effectively scattered, as taught by Duggal.

5. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Affinito (6,268,695) (of record) in view of Duggal et al. (US 2001/0033135 A1) (of record) as applied to claims 2-18 and 21-27 above, and further in view of Fork (6,339,289) (of record).

Affinito discloses an OLED having an active region (160) and a composite barrier layer having high-density sublayers and polymeric planarizing sublayers to shield the device from moisture and oxygen.

Affinito lacks disclosure of microparticles formed within the polymeric planarizing sublayers.

Duggal teaches microparticles formed in a polymeric planarizing sublayer in order to scatter the emitted light, and thereby increase the efficiency of the device.

Duggal teaches microparticles that have a mean particle size of 100 nanometers or less (10 microns) (page 3, paragraph 0036, lines 7-10).

Both Affinito and Duggal lack disclosure of the pixel size of the OLED.

Fork teaches an OLED with pixels that are 300 microns across (column 5, line 9) as part of an OLED designed to prevent dark spots and thereby improve imaging.

Regarding claim 19, when such a pixel size is combined with the microparticle size disclosed by Duggal, the microparticles are smaller than the smallest lateral dimension of the pixel combination.

Regarding claim 20, the pixel size taught by Fork fits within the claimed pixel size range of 10 microns to 300 microns, and the microparticle size disclosed by Duggal fits within the claimed microparticle size range of 0.4 microns to 10 microns.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Affinito's OLED to have microparticles of 100 nm or less in size in the polymeric planarizing sublayer, as taught by Duggal, in order to create scattering that increases the efficiency of the device, and to further modify the OLED to have pixels that are 300 microns across to provide a display with improved imaging, as taught by Fork, and thereby provide pixels that are larger than the microparticles contained in the polymeric layer.

Response to Arguments

6. Applicant's arguments with respect to claims 2-30 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharlene Leurig whose telephone number is (571) 272-2455. The examiner can normally be reached on Monday through Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Sharlene Leurig

ASHOK PATEL
PRIMARY EXAMINER